

# Left Heart Catheterization

## The Clinical Importance of Findings

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THE USUAL CLINICAL METHODS of diagnosis may be relied upon in most cases for the correct diagnosis of typical valvular defects of the heart. However, occasionally these methods may be misleading. In certain valvular defects left heart catheterization will eliminate these uncertainties. This procedure is valuable in a number of circumstances: In evaluating the degree of mitral stenosis in some patients in whom it is difficult to evaluate the symptoms, in determining the more significant lesion when mitral stenosis and insufficiency are associated in determining the severity of aortic stenosis and in determining the significance of the various lesions when aortic and mitral disease are present.

The development of surgical procedures on the mitral and aortic valves brought about a need for more precise diagnostic methods for determining the nature and extent of abnormality of these valves. In 1952, Facquet, Lemoin, Alhomme and Lefebvre<sup>3</sup> in France and in 1953 Allison and Linden<sup>1</sup> of Leeds described a method of obtaining left atrial pressures by the transbronchial route. Recently Morrow, Braunwald, Haller and Sharp<sup>4</sup> of the National Heart Institute reported on 500 cases in which this procedure was used. They extended the technique by passing a catheter down the left atrial needle into the left atrium and on into the left ventricle. In 1953 Bjork, Malmstrom and Ugglä<sup>2</sup> in Craaford's clinic in Sweden developed the posterior percutaneous puncture technique. This method also has been extended to include left ventricular catheterization by passing a catheter through the needle into the left atrium and then advancing this catheter into the left ventricle. The ability to obtain the left ventricular pressure using both of these techniques, and therefore to determine accurately the presence or absence of any abnormal pressure gradients across both the aortic and mitral valves is of great aid in the diagnosis of certain types of heart disease. Because of the reportedly high morbidity and mortality associated with using the posterior percutaneous route, we have not employed this method but have used the transbronchial method exclusively.

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• Left heart catheterization using the transbronchial route to obtain pressures in the left atrium and left ventricle was used successfully in 29 cases with no mortality or morbidity. It was found to be useful in differentiating between mitral stenosis and mitral insufficiency, as well as determining the amount of aortic stenosis present when there was involvement of the aortic valve. The technique was also helpful in determining which is the predominant lesion when there is a disease of the aortic and mitral valves.

In two patients in a series of 29, data obtained by left heart catheterization forestalled operation on the basis of a mistaken diagnosis of mitral stenosis when actually no mitral valvular disease was present. In another eight patients, the predominant lesion was found to be mitral stenosis rather than mitral insufficiency as it was thought to be before catheterization. In two patients, who had only systolic murmurs, catheterization revealed mitral stenosis rather than mitral insufficiency. In four patients who were thought to have mixed valvular disease, left heart catheterization showed only aortic valvular disease.

This communication is a report of the results in 29 patients in whom the transbronchial approach to the left atrium and left ventricle was used. The technique used was essentially that described by Morrow.<sup>4</sup> The patient is prepared for left heart catheterization by fasting for six hours. Oral barbiturate is given an hour before catheterization and meperidine and scopolamine are given a half hour before the procedure. The pharynx, larynx and trachea are anesthetized topically with cocaine, pontocaine and xylocaine. Electrocardiograph electrodes are placed in position and a Cournand needle is inserted into the femoral artery. A standard 7 or 8 mm. bronchoscope 40 cm. in length is advanced to the carina and a point on the anterior wall of the left main bronchus about 1 cm. from the carina is selected for the puncture. Effort is made to direct the needle as far anteriorly as possible. This is facilitated by rotation of the bronchoscope so that its beak lies posteriorly. The needle, filled with saline solution, is introduced into the bronchoscope and a zero or base line pressure tracing is recorded before the needle pierces the bronchial mucosa. The needle is inserted through the bronchus and into the left atrium and is immediately irrigated with a

sterile saline and heparin solution. The left atrial pressure is recorded during several respiratory cycles and during a period of apnea in mid-inspiration. The left ventricular catheter is then introduced into the proximal end of the needle. The catheter is slowly advanced into the atrium and on into the ventricle. The left ventricular pressure is recorded. Simultaneous pressures are recorded from the Courmand needle and from the catheter in the left ventricle and a "pull-out tracing" is made as the catheter tip is slowly withdrawn from the left atrium.

Analysis of the data obtained by this method in the first 29 patients in whom it was used at The Saint Vincent's Hospital was informative and helpful. In two of the patients, the diagnosis before cardiac catheterization was possible mitral stenosis. However, left heart catheterization revealed no evidence of mitral disease. In five patients, the pre-catheterization diagnosis of mitral stenosis was confirmed. One patient with hemoptysis was known, even before catheterization, to have mitral stenosis and also bronchiectasis, but the severity of the mitral disease was not known. Left heart catheterization revealed that it was quite severe, and the hemoptysis was therefore ascribed to it rather than to the bronchiectasis. In eight cases in which the diagnosis before catheterization was pronounced mitral insufficiency as well as mitral stenosis, mitral stenosis was found to be the predominant lesion. Two patients who were thought to have mitral insufficiency without mitral stenosis, were found upon cardiac catheterization to have mitral stenosis without any evidence of mitral insufficiency. Four patients were thought to have aortic stenosis, and left heart catheterization verified this diagnosis. Four patients were thought to have mixed lesions of the mitral and aortic valves, such as mitral stenosis, mitral insufficiency as well as aortic stenosis or aortic stenosis and mitral insufficiency. Left heart catheterization revealed that they had aortic disease without evidence of mitral disease. Another patient, who was thought to have only aortic insufficiency,

upon left heart catheterization was found to have mitral stenosis, mitral insufficiency and aortic insufficiency. In a case in which it was believed the patient had mitral stenosis and an atrial septal defect, no end diastolic gradient across the mitral valve was noted when catheterization was done. In this case the procedure was very informative, for at operation a tight mitral stenosis as well as an interatrial septal defect was observed. This study revealed that in the presence of both lesions there will be no gradient across the valve. In one patient we were unable to pass the needle into the left atrium. Roentgen films showed pronounced scoliosis and a normal sized left atrium. The patient probably did not have heart disease. We also had technical difficulty in six other cases: We could not pass the catheter into the left ventricle, usually because of pronounced mitral insufficiency. In these cases each time the catheter approached the mitral valve it was washed back by the systolic jet. However, the left atrial pressure was enough to make the diagnosis in these patients.

#### ADDENDUM

Since this paper was submitted 23 more patients have had left heart catheterization with similar results and no complications.

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#### REFERENCES

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